

PERFORMANCE MANAGEMENT IN PUBLIC ORGANIZATIONS: A COMPLEXITY PERSPECTIVE

Jie-Shin Lin and Po-Yu Lee

ABSTRACT

During this uncertain and turbulent knowledge-oriented era, simple linear organizations are no longer able to face the current openness, conflicts, chaos, randomness and uncertainty. Therefore, amoeba or multi-faceted organizational structures are on the rise and performance management of organizations should change their present course. This research employs complexity theory to review the innovation of performance management in public organizations. It further emphasizes the unpredictability and nonlinear-development and focuses more on how modern organizations can create dynamical performance management with paradox management, co-evolution and self-organization management methods to examine performance management of public organizations.

Keywords – Chaos theory, complex adaptive systems, performance management, public management

INTRODUCTION

With the coming age of globalization, government organizations around the world will face the challenges in the new century of complex governance from both internal and external environments. The spill-over effect of functions, the linking effect of issues and the involving of pluralistic actors have appeared in a number of new public issues and public affairs. These effects not only increase the complexity of public governance but also cause public organizations, within the pluralistic governance environment, to improve governance ability to ensure the delivery of quality services. Due to the diversified content of public affairs and the demands of interdisciplinary governance, this research innovatively employs complexity theory to discuss the innovation of performance management in public organizations.

The paradigm shift in organizational behavior research (from traditional close, harmonious, controllable, linear, predictable organizations to currently open, conflicting, disorderly and random systems) complies with the trend of globalization's complex impact on organizations' internal and external environments. Complexity theory empha-

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sizes the unpredictability and nonlinear development of events of Chaos Theory, as well as focuses on the shared border of chaos and order, and the creation of the dynamic 'edge of chaos' and novel 'emerging properties' through the characteristics of interaction, adaptation, co-evolution, and self-organization. In modern periods, governments around the world have promoted the reinventing of public organizations. Other than organizational innovation, this research will focus on the 9 propositions of complexity theory, along with paradox management, co-evolution and self-organization management methods to examine public organizations in order to improve the quality of public services on the basis of when their performance management falls into the intersection of chaos and order, how governance ability can be adjusted and how to reform organizations to create novel emergence.

COMPLEXITY AND COMPLEX ADAPTIVE SYSTEMS

In recent years, a field of study that is increasingly attracting research interest is the study of complexity. Metcalfe (1998) suggests that '*an organization cum technological complex, a set of instructions for translating input into output for a purpose. This complexity is constituted by a set of routines to guide behavior, routines which collectively constitute the knowledge base of the particular activity.*' Nevertheless, the science of complexity is highly associated with complexity theory research of the Santa Fe Institute. The focus of complexity theory is to investigate the relationships between different parts of a system and how they interact, whereas agent-based computational modeling (ABCM) uses analyzed results from computer simulations to understand the nature of complexity. ABCM is highly associated with complexity theory research of the Santa Fe Institute. A variety of different concepts or meanings of something like complexity are captured to all our intuitive ideas about what is meant by complexity. In fact, researchers using complexity language in their theorizing are not all of the same ilk and they are on different ontological levels, but are united by some broad and interrelated themes. Some active themes are described in earlier family resemblance of complexity research, in particular, applications of nonlinear dynamics. While chaos has been replaced from its place in mid-1980s, the perspectives of positive feedback or increasing returns, path dependence and lock-in have come to the core. Increasing returns are best seen as dynamic processes with random events and positive feedbacks. In contrast to diminishing-returns, the positive feedback or increasing-returns makes for many possible novelties. But, once random events select a particular path, the choice may become locked-in regardless of the advantages of the alternatives (Arthur, 2000). Over time, increasing returns magnifies the cumulative effect of such events to select the outcome randomly. There are emerging properties resulting from the cumulative self-reinforcing process or path-dependent.

In scientific discourse, complexity is also seen as a system with multiple elements or entities adapting or responding to the pattern they create. In many systems, a very large collection of relatively simple entities or agents, operating with no central control and/or limited communication among themselves, collectively produce highly complex, coordinated, and adaptive behavior. The entities might be cells in a cellular automaton or an immune system. They behave and therefore react to neighborhoods (neighboring cells), states and the patterns they respond to vary from one context to another. In particular, the entities adapt to the world they co-create. In the sense, the observed agents imitate one another, that old practices are replaced by a social process and that new ones are

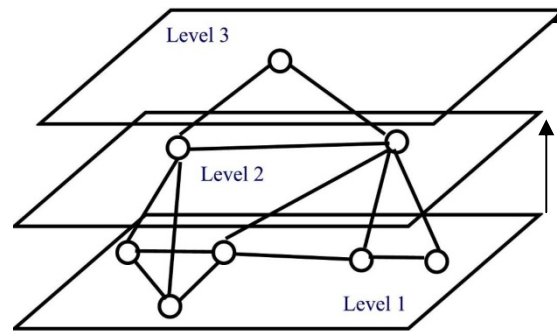
spread by imitation and the acquisition of characteristics. This implies diffusion process or a kind of information contagion together with path-dependent and lock-in effects. In particular, the mix of rules actually used in a population or society is the outcome of co-evolution in which one agent is adapting or learning, all other agents are adapting or learning simultaneously (Arthur, 1994; 2000). Such systems also naturally can be found in the socio-economic sphere. The view of a decentralized, evolving system is by no means new and goes back at least to Adam Smith's "*invisible hand*" metaphor in economics, and Darwin's "*evolution by natural selection*" in biology. They share the same view of spontaneous process can produce order and seemingly purposeful design or consciousness, the "*as if*" statement. The fuel of the process of development is the "*division of labor*" for Smith and "*variety*" for Darwin. For Smith, the incentive to the process of development is the "*pursuance of self-interest*" underlying the specialization in the division of labor and, for Darwin, it is the "*struggle for existence*" underlying the characteristic of variety. The modern general study of how such emergent adaptive behavior or emergent properties come about has been called the study of '*complex adaptive systems*' (CAS).

Three main themes to be noted are (1) the absence of heterogeneity (2) and therefore interaction, as well as (3) rationality problem (Lin, 2005; 2008). Traditional perspectives fail to describe the interaction processes and resulting emergent properties, in which the state and its novelties changes over time. In addition, they cannot represent the distinction between agent- and system-levels, in particular, the problem of heterogeneity. This induces the existence of interaction relationships between these heterogeneous agents and brings the significance of innovative learning processes that are distributed between agents or institutions. The distributedness of learning i.e. a distributed innovative learning process varies in degree, and takes a variety of dynamic forms. A possible source of creativity in knowledge is through the amalgamation of different underlying learning, so that already existing but previously separate ideas may fertilize each other and therefore produce a sum greater than their constituent parts. In addition, the heterogeneity also represents source of competition between agents. While we view competition as a dynamic process, it explains a set of concepts which are variety, selection and development (Metcalf, 1998). Therefore, agents learn (induced by the heterogeneity i.e. variety among agents) and adapt (selection among variety) in order to survive in the environment (toward to a new development).

Holland & Miller (1992) defined a complex adaptive system (CAS) as follows: (1) it consists of the networking of interacting agents; (2) it is dynamic and there is an emerging property; (3) the emerging property can be described without detailed knowledge of the behavior of individual agents. Also, an agent in the CAS is adaptive if (1) the action of the agent in the system environment can be assigned a value in terms of performance, utility, payoff, fitness, or the like, and (2) the agent's behavior evolves. In short, a complex adaptive system contains adaptive agents, networked so that the environment of each adaptive agent includes other agents in the system, a complex nexus linking. Yet, complexity does not mean the structural complication even if it is really complicated. Indeed, it is that interactions among agents and between agents and the environment and their resulting consequences can be complex. Such the framework involves a complex hierarchical network of active objects. In the sense, the complex adaptive system evolves through a hierarchical dynamic i.e. stable intermediary forms are used to construct stable higher level structures, which in turn are used to construct even higher level

structures, and so on. It is that a higher level emerges from its constituent parts and their interactions at the lower level. Hierarchies can sustain themselves. These hierarchies are overlapping so that their vertical structures are interlaced with those of other hierarchies in multiple horizontal networks (Figure 1).

Figure 1: Overlapping Hierarchies in a Multiple Horizontal Networks Structure



Resource: This study

THE EVALUATIVE CONCEPT OF PERFORMANCE MANAGEMENT

Performance management, originally developed for the private enterprise sector, consist of the practical strategy and management techniques for improving employee performance in order to pursue corporate performance. Some studies focus on appraising the ‘past performance’ of the employee and the organization. However, the innovative concept of performance management referred to initially by the journal *Personnel Psychology*, is to add the ‘future performance’ of the employee and organization into the management structure, and further to explore various new management strategies in achieving organizations’ goals (Beer et al., 1978). To propose the innovation of ‘no measurement, no performance; no performance, no management’, these management techniques and methods have been adapted by increasing amounts of private enterprises, and have received attention from public sector managers. These strategies include strategic planning (making decisions on allocating the resources to pursue organizational goals), performance measurement (measuring performance methods to pursue these goals), performance monitoring (tools for planning and managing the performance resources), and total quality management (methods based on customer-orientation, team-work and gradual improvement of services and procedures). These similar techniques, applied generally, explain the increasingly significant role of performance management during administrative reforms.

The original intention of promoting performance management in private enterprises with limited resources is to not only manage financial expenses efficiently but also to innovate and achieve higher performance goals. With the widening of application areas of strategy and management tactics to performance management, researchers from various sectors have started giving performance management different definitions. For instance, traditional performance management focused on developing the competence and responsibility of organization members to achieve goals of team. In other words, traditional performance management is the process of encouraging employees to meet the

organization's requirements to increase efficiency and effectiveness in working environments. Alternatively, Marr (2005) suggests 'business performance measurement and management, BPM', defining performance management according to the following measurement items: i) performance measurement complies with management; ii) performance measurement and management must be linked to organizational goals; and iii) to achieve overall performance management, organizations must consider the methods, structures, goals and strategies of performance measurement. Lunger (2006) argues further that modern performance management must originate from organizational development strategies, goals and values, the coordination functions of performance, the satisfaction of internal and external customers, the focus on group and team performance, the emphasis of cross-sector and cross-function appraisal, the performance monitoring and development, the evolution of performance measurement with time and sustained growth.

Armstrong (2008) pointed out that the application of performance management is to improve the organization members' performance by developing the capability of the team and its members through a strategic and integrated system which can encourage organizations to operate successfully. Since 1980s, government reinventing movements around the world have initiated the 'new public management' trend. Therefore various theories, definitions and methods based on performance management have eventually become significant political tools for improving the performance of public organizations and the quality of public services. Meanwhile, the performance-based government operation has become fundamental to implementing the essence of new public services and strengthening national competitiveness.

COMPLEXITY THEORY AND PERFORMANCE MANAGEMENT

Traditional determinism and quantitative-based research argue that human behaviors (like all natural phenomena) have one certain rule to follow, and can also explain, predict and search for the answers while using the concept of 'X causes Y' causal inference. However, complexity theory argues that the characteristics of openness, chaos, disorder, randomness and unpredictability in the systems cannot be solved by simple mechanistic or linear inference. Based on this assumption, the essential propositions of complexity theory are as below (Fullan, 2000: 4-5; Stacey, 1996: 349; Chen, 2007: 201-202):

- All organizations connect internal and external environments through webs of nonlinear feedback loops.
- Web of nonlinear feedback loops operate in the dynamic process between stable and unstable situations, i.e. the edge of chaos.
- All organizations are paradoxes. On one hand, for the purpose of integrity, monitoring, sense of security, sense of stability and environmental adaptability, organizations will generally move towards stable zones inevitably. On the other hand, the pursuit of differences, separation, stimulus and risk, as well as the instinct of self-protection drive organizations towards an unstable development.
- Organizations will gradually ossify, atrophy, and eventually lose response and innovation capability if they continually shift towards the stable zone. Alterna-

tively, if organizations completely move towards the unstable direction, they will definitely disintegrate and collapse eventually. Therefore, organizations are only able to continue their evolution and develop permanently when they are placed in the intersection of both the stable and unstable situations. This is called '*the edge of chaos*' which is an unsustainable dissipative structure.

- The evolution process of organizations is an irregular, discontinued, and leap-ing development, with a vague but hidden order.
- Due to the irregular evolution process, the future of organizations remains chaotic and difficult to predict.
- The characteristics appearing in the complexity system fail to predict the fu-ture and the navigation of its unique structure. In the meantime, the complexi-ty system cannot use rational behavior to influence future development.
- The long-term development of a dynamic process in complexity systems relies on the spontaneous self-organization process, the strategy used to direct the organizational evolution where it could emerge at any time. The forming of spontaneous self-organization means political interaction and learning pro-cesses among organization members. Therefore, managers should understand how to apply analogies to solve chaotic, vague and paradoxical issues.
- It is necessary for managers to employ creative thinking to search and explore the interaction between organizations and the environments.

Facing the innovation of modern performance management, this article attempts to use complexity theory viewpoints to examine and demonstrate how in performance man-agement where the organization is in the edge of chaos situations between orders and chaos, organizations can apply paradox management, co-evolution and self-organizations to adjust its own management capability and create novel emergence through self-revolution in order to improve the quality of public services.

Paradox Management: Fractal Universe and Orderly Chaos

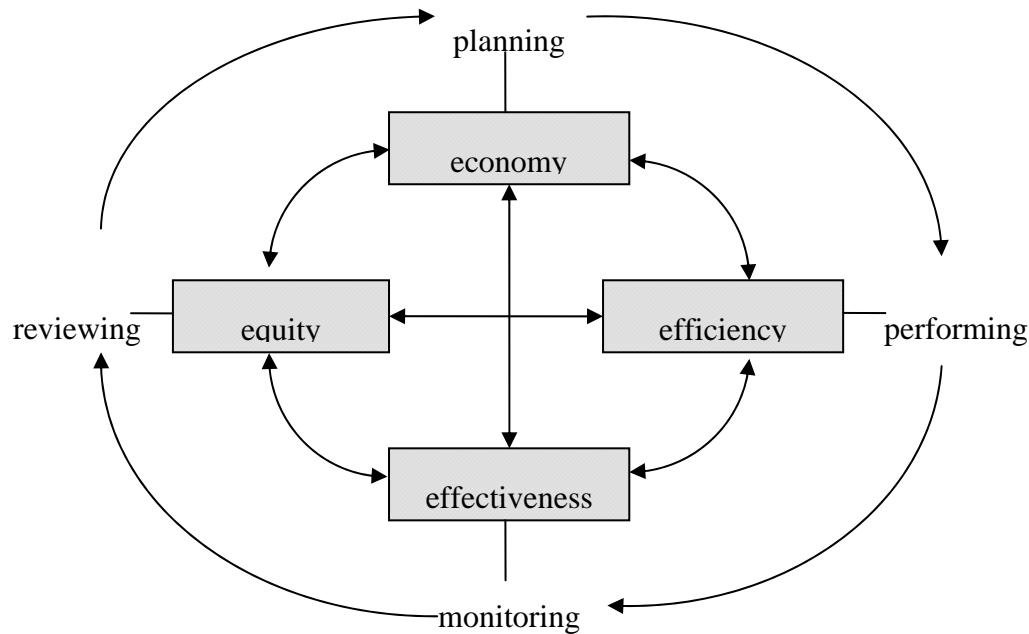
The edge of chaos emphasized by complexity theory is a phenomenon of chaos and or-der existing simultaneously. In other words, it is the paradoxical situation that two mu-tually exclusive events exist simultaneously. Complexity theory refuses to employ pen-dulum theory to understand this phenomenon, and thus it is unlikely to choose one or another. However, even researchers tend to solve issues through self-defining whether order or chaos situations remain, and therefore one can only remain in the intersection of chaos and order, or face the paradox, manage it and go through it to discover 'the third district' and harmonize the opposite opinions. Therefore, the value competition of 'efficiency' and 'equity', which are mutually exclusive to other but exist simultaneously, completely demonstrates the paradox situation in the history of administrative science development over the last 100 years.

Wilson suggests in *The Study of Administration* in 1887 the '*Politics-Administration Dichotomy*', which argues that the administration should not be influenced by politics. This opinion caused the rapid growth of public administration science and consequently developed a number of research methods, which included scientific management, be-haviorism, public policy, public administration, policy implementation, economic theory

(for example, agent theory, public choice theory, transaction cost theory) and bureaucracy. The main subjects of public administration at that time emphasized the concept of efficiency, which means how governments achieve public goals efficiently. As per this opinion, Waldo agrees the definition of efficiency is the value of administration, but however argued that it is not the solo value for government management. Based on this view, Waldo recommended '*social efficiency*', and suggests the essence of efficiency must connect to the public interest, individualism, freedom, equality and other human values. The real efficient government must be democratic, and therefore it must satisfy the demands from people. The real democratic government must be efficient, and therefore can perceive the demand from people, applying knowledge, honesty, integrity and economy to realize the will of the people (Waldo, 1984:131; Lin, 2003:59). Following the trajectory of historical institutionalism, if the debate focuses on each development stage of administration science and is placed on the timeline of history, that is, placing politics in time, it is not difficult to find that analyzing the process of events and the consequences using the timeline will help us to interpret complex political phenomena and social movements. With the forming of the track of path dependence for self-reinforcement and positive feedback, or the existence of single or multiple combined factors changing the original path, paradigm theory dominates the common language of administration researchers from each period when delivering tacit knowledge. This is the swing effect between efficiency and equity. It may be worthwhile to conduct further research on whether anarchy chaotic effects remain or emergent properties based on complexity theory merge into the solo stream to continue this development. Modern performance management theory has developed towards the paradox path around the edge of chaos.

Present developments of performance management focusing on the discussion of performance measurement techniques hope to remain on the edge of chaos among the 4 E principles - *Economy, Efficiency, Effectiveness and Equity*, operating in a dynamic process between stable and unstable situations and discovering the third district to harmonize the opposite opinions. The purpose is to create the precise measurement indices to measure organizational performance and member behavior, and particularly to break the previous single order phenomenon – that is, either efficiency theory or equity theory. Therefore, treating performance measurement techniques as the essential part and assuming performance management as an entire process of management, this procedure includes the following four steps: (1) planning: deciding what to do and how to do it; (2) performing: bringing the planned operations into action; (3) monitoring: inspecting the work completed or in progress, measuring the results and evaluating the project process; (4) reviewing: evaluating the finished work, and if the overall performance is far below the original plan, the plans and operation procedures will be fixed. The above four steps are closely connected to each other from planning to reviewing and have become the essential components in developing the performance management cycle (Armstrong, 2008: 15-16; Cable, 2005: 6). Figure 2 shows the cycle. In terms of creating the techniques of measurement indices, the above performance management processes are connected through webs of nonlinear feedback loops. 'Efficiency theory' and 'equity theory' operate in a dynamic process between stable and unstable situations to form a series of management formulas crossing through the paradox. This phenomenon complies with the idea of '*simple hidden complexity*' (either efficiency theory or equity theory), '*order born of chaos*' (emergence of combined efficiency theory and equity theory), and 'the edge of chaos' (coexistence of order and chaos).

Figure 2: Performance Management Cycle



Resources: modified from Armstrong (2008: 17)

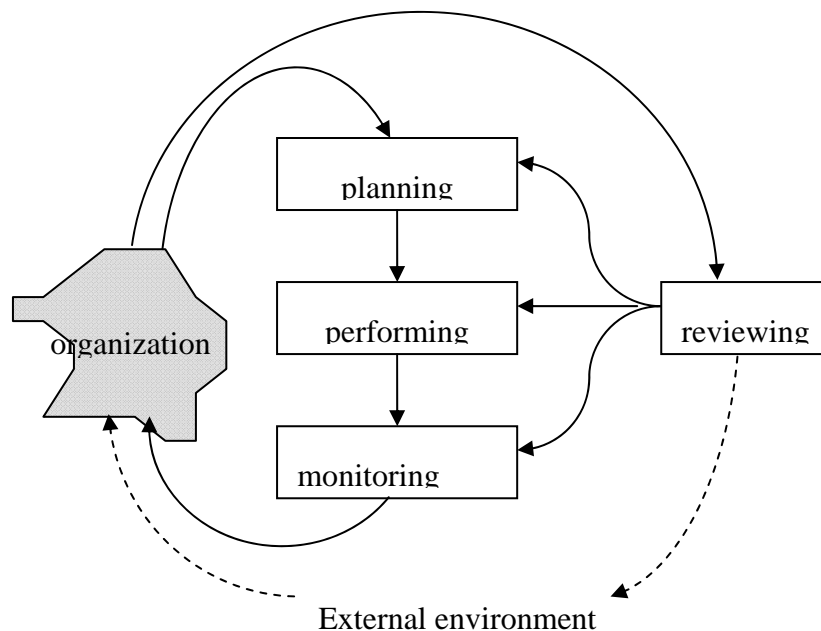
Co-Evolution: Feedback Loops and Inter-Adaptation

Whether it is David Easton's system theory of input-transform-output-feedback in the political science field, or decision making serialization theory (that is, establishing agendas, identifying problems, policy planning, policy legalization, policy implementation, policy reviewing), they are both the consequence of traditional linear structural thinking. However, complexity theory conceives that all organizations form a purported 'complex adaptive system (CAS)' (Stacey, 1996). This system is a multilayer network connection, which is an endless dynamic evolution process in essence. All components of the system, according to the behavior of other parties, communicate and interact in the webs of nonlinear feedback loops, to establish the co-evolution situation. As per the four steps of traditional performance management process, all planning, performing, monitoring and reviewing steps appertain to linear structural thinking. Even though the goal of these steps is to ensure that organizations achieve the best performance with existing policies, goals, organizational structures and organizational culture, this process cannot confront the adjustments of internal communication and external interaction. To solve this problem, Smith and Goddard argued, during the complicated process of performance management, organizations as the main operators should not only continue viewing performance, but also monitor external changes to improve the validity and reliability of performance management by revising various elastic coping strategies throughout unbalanced dynamic processes (Smith and Goddard, 2002: 248).

According to the opinions of the complex adaptive system, environmental influences performing and its interaction provides feedback to the organization and the external environment will be sent back to performing eventually. Performance, as the representation of fitness, is the result of behavior interaction and organization & environment in-

teraction, but not the consequence of behavioral traits. Fitness is a measure of the differential tendency of competing entities or behaviors to have a propensity to grow as a joint result of environment effects and behavioral traits. Either at the individual stage of the performance management process, or at the intervals between stages, the gap between each stage and external environment remains in an unbalanced situation due to the changes and holds the ‘*struggle for existence*’ or adaptive relationship through co-evolution and inter-adaptation. From the point of view of co-evolution (feedback loops and inter-adaptation), the evolution of the individual actor will influence other actors’ evolution and adaptation, and eventually will alter the behavior of each other to create novel emergence (Lin, 20008). According to the co-evolution viewpoint of complexity theory, not only is each stage of the performance management process able to inter-adapt, but the organization itself has the function to influentially effect and cause self-evolution. The final results rely on the changes from the external environment, and therefore it becomes likely to enlarge the capability and efficiency of performance measurement and applicability in practical management practice (Figure 3).

Figure 3: The Process of Performance Management



Resource: This study

In recent periods, with the staggered development of traditional public administration, New Public Management (NPM) and New Public Administration (NPA), the co-evolution concept of the complex adaptive system increases the validity and reliability of performance measurement indices, and also improves the accuracy level of performance measurement and enlarges the complex application process of performance management. For instance, recently researchers of administration science, during the evolution progress of performance management, have demonstrated the innovative meaning of organization/employee performance, in order to rebuild the emergent property of performance in complex systems, including (Talbot, 2005; Yang, 2009: 7-8; Su, 2009: 108):

- Performance as accountability: Apart from focusing on the actual results in public sectors, performance information of democratic countries can also be used to improve the result of public organizations through the auditing and reviewing mechanism. This has been demonstrated by political accountability and information transparency of governments in recent periods.
- Performance as user choice: Similar to the product/pricing information, the performance information of public organizations is the influential index for consumers and people making choices, as well as the measurement evidence of re-allocation of resources.
- Performance as customer services: Public organizations should regard people as customers and provide introduction of services levels emphasizing on three aspects: timeliness, accessibility and quality. A final report on whether organizations complete the goals should also be presented.
- Performance as efficiency: This focuses on the organizations' internal efficiency from input to output when governments make decisions. Due to the influence of principal-agent theory, this characteristic also emphasizes the improvement of X-efficiency.
- Performance as fitness, effectiveness, and 'what works': In the past, government organizations paid attention to the inputs and processes of public policy and ignored the fitness effect caused by the influence of feasible policies interaction. Regarding this point, performance management should promote the concepts of fitness-oriented, effectiveness-oriented and problem-solving-oriented effects.
- Performance as resource allocation: The information of effectiveness and output results will be essential in allocating resource. Although this opinion also involves efficiency as well, it focuses on 'Y-efficiency' which is more focused on allocative efficiency.
- Performance as creation of public value: Public services provided by governments are not just simply certain commodities or responses to market failure. Instead, they can increase public value and establish the capital of the society. It is unlikely for private sectors to provide such functions.

Self-Organization: Fabricated and Ex Nihilo

James D. Thompson (1967) initially defined and established in the literature the concept of self-organization. The orders of complex adaptive systems have no pre-made path of rules, and order forming does not need any external interruption, rather than spontaneous self-organization and self-adjustment. Therefore, this autogenesis causes the creation of new structures, rules and orders due to the consequence of nonlinear interaction within the system (Fontana and Ballati, 1999: 15; Morel and Ramanujam, 1999; Waldrop, 1992). In other words, self-organization means the adjustment ability of creativity and autogenesis, as the actors within the system will interact with each other following behavior rules of their sector. Eventually organizations appear consistent in terms of reform and innovation, which is also called 'emerging properties', after countless self-organization, interaction and co-evolution between system and sub-system. This is also the significant characteristic of the organizational life. In the area of public administra-

tion, the reformation which focuses on performance is actually the staggered development of traditional public administration, new public management (NPM), and new public administration (NPA) (Talbot, 2005: 493). The conflicted and paradox edge of chaos in the life of organization creates innovative emergence due to the characteristics of dynamic interaction, co-evolution, and self-organization. Therefore, from the view of self-organization in complexity theory, performance management during the operation of public organizations can be interpreted in terms of ‘*organization*’ and ‘*actors within the organization*’. Due to the co-evolution and self-renewal process, the definition of performance management will be enriched and innovated consistently.

Table 1: The Performance Indices of ‘Organization’ and ‘Actors within Organizations’

Performance Indices of Organizations	Performance Indices of Actors within organizations
(1) Different ownership	(1) Elected administration leaders are able to improve the political control in the civil service system through carrying out performance management.
(2) Different transaction mechanism	(2) Elected members of Parliament can establish the principle of accountability in the democratic system through performance management.
(3) Competency levels	(3) For managers within the civil service system, performance management is able to strengthen the efficient management of administration processes, to improve the quality of administration services and increase the competence of public organizations.
(4) Different political duties	(4) For civil officials who carry out policies, performance management may even have a steering navigation effect and ensure associated members understand the work requirement and essential responsibility required by managers.
(5) Degree of variability	
(6) Complexity level	
(7) Uncertainty level	
(8) Difference of authority structure	
(9) Autonomous level	

Source: Carter (1995) and Sun (2009)

As shown in Table 1, for either public or private sectors, the majority of literatures on performance focus on the discussion of organization. From the aspect of the organization, this it will be helpful for management where they intend to introduce a private sector performance management concept into the public organizations. However, the differences in essence between public and private sectors will certainly cause the different performance management indices, which include the following 9 indices (Carter, 1995): (1) Different ownership; (2) Different transaction mechanism; (3) Competency levels; (4) Different political duties; (5) Degree of variability; (6) Complexity level; (7) Uncertainty level; (8) Difference of authority structure; and (9) Autonomous level. In terms of ownership, public sectors establish the organizational performance index based on the

public interest of people. However, private sectors set profitability as the essential index. Regarding the variability level of organizations' services, compared to single service or product from public sectors, the private sector must aim at increasing the variability of services and products in designing the performance index.

Additionally, regarding the actors in public organizations (shown in Table 1), the multiple actors or participants in modern democratic countries (such as elected administration leaders, elected members of Parliament, managers who promote innovation within the civil service system, and officials who execute policies in the civil service system) each have different understandings and considerations due to their different positions in the entire system. Elected administration leaders are able to improve the political control in the civil service system through carrying out performance management. Elected members of Parliament can establish the principle of accountability in democratic system through performance management. For the managers within the civil service system, performance management is able to strengthen the efficient management of administration processes, to improve the quality of administration services and increase the competence of public organizations. For civil officials who carry out policies, performance management may even have a '*steering navigation*' effect and ensures associated members understand the work requirement and essential responsibility required by managers (Sun, 2009: 591; Yang, 2009).

As per this point, Sun (2009) gives further conclusion of the three definitions of the performance management of public organizations or governments (Sun, 2009: 592-593):

1. **Performance management is a type of control program:** The program includes three steps: goals establishment, performance measurement and error corrections. Goals establishment means creating the future development's core value and various policy application indices of public organizations. Performance measurement, however, focuses on establishing more valid and reliable indices to measure the operating performance in public organizations. Performance monitoring is mainly expected to follow and discover the error between actual performance and initial plans using the methods of performance monitoring. In related control programs, the essential step is the correction of errors. During the performance management process in public organizations, if errors or omissions have been detected but are not corrected, this indicates the development of organizations will enter into a losing-control plight.
2. **Performance management is a process of political communication:** Government organizations' performance management in democratic countries actually involves a series of revolution process of political communication. Firstly, administration leaders elected by people, as the sole person establishing policy goals and objectives, may employ performance management to strengthen the political control of the civil service system. The managers within this system will convert a number of requirements into performance indices and require fellow civil officials to apply related indices to improve the quality of public services. For the administration system, elected members of parliament and common people are able to use related administration performance indices to measure the governing ability of the government and become the essential monitors in administration performance management. Various political disputes could be caused if there is a dramatic difference on the

understanding and requirement of performance management between the above public sector actors, as these participants will not be able to establish good political communication methods.

3. **Performance management has the function of leading:** Previously, government performance management focused on a '*top-down*' strict management, and believed the hierarchical management model could guarantee the efficiency of administration. However, in recent years, the performance management movement integrated various government innovation ideas, and promotes the idea that governments should swap its role to a '*navigator*', who leads to result-oriented performance type government and customer-oriented service type government.

The above three definitions not only reaffirm the significance of performance management as the political tool of public organization innovation, but also highlight the self-organization, adaptive and evolution process of performance management in complex systems.

CONCLUSIONS: CHALLENGE AND DEVELOPMENT

Due to globalization and inherent disappearing geographical boundaries, and the loss of wealth since 2008, the far-reaching communication networks connecting the entire world increases uncertainty as each of the parts of the world interact and influence each other. During this uncertain and turbulent knowledge-oriented era, simple linear organizations are no longer able to face the current openness, conflicts, chaos, randomness and uncertainty. Therefore, amoeba or multi-faceted organizational structures are on the rise. For performance management, they are no longer simple work comments, but rather a performance management method based on multiple assessments and multiple feedbacks. This phenomenon indicates the higher degree of dependence between organizations members and external environments. Consequently, the interface relationship is becoming more diversified.

To face this challenging environment that continues to change dramatically, public organizations may fail to improve the efficiency and effectiveness of organizations when introducing performance management of private sectors. Therefore, performance management of organizations should change their present course. This research employs complexity theory to review the public organizational performance management, emphasizing the unpredictability and nonlinear-development and focusing more on how modern organizations can create dynamical performance management with the characteristics of inter-adaptation, co-evolution and self-organization. Therefore, the process of performance management in public administration will face several structural challenges.

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First, we recommend transformation from ossification to a regime of elasticity. The higher the degree of uncertainty of the environment, the more often the measurement standard of performance management will not meet the actual demand. Managers of organizations within the dynamic process between stable and unstable situations will have to master the application of paradoxical management methods to adjust related performance demonstration methods and respond rapidly during the fast changing time/space environments, in order to improve the organizational performance. Second, replace monist with pluralism. Due to the complex internal and external environments of organizations, elected officials, members of parliament, managers of organizations, civil officials and citizens have different expectations and demands from performance management. The involving of pluralistic actor opinions causes conflicts due to the different interests from participants during the promotion of performance management in public organizations. Therefore, organizational managers must learn to apply co-evolution management methods and discover the adaptive process from the pluralistic-actors' inter-evolution.

In addition, performance management has to include unilateral provision of feedback. Because of the globalization effect, each of the external and internal departments and staff of organizations have broader width and are becoming more complicated in their interaction between each other. The roles they are playing are getting more plural and must therefore have multi-directional communications in order to ensure that each individual actor is to be connected efficiently. Through pluralistic feedback, it is more likely to give the participants a clearer understanding that continued communication can eliminate the understanding difference and increase their performance. In the end, performance management is a co-existence of equity and efficiency. Many of the normative values of public organizations (e.g., sociality, transparency and the nature of political behavior) make it virtually impossible to apply private sector cost effectiveness and profitability indices in reviewing governmental policy or performance measurement. In other words, performance measurement in public organizations must not only assist in designing indices; it must assist in the creation of reviewing and managing standards, and must carefully consider validity and liability issues so as to reflect the actual circumstances of public organizational operation.

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